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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Charles R. Piskoti et al.

Ser. No.: 09/518,989

| Group No.: 1754

Filed: 03/03/2000

| Examiner: S. Hendrickson

For: Carbon Based Thirty Six Atom Spheres

APPEAL BRIEF

Commissioner of Patents and Trademarks
Washington, DC 20231

Dear Sir:

Applicant hereby submits this brief in support of an appeal to the Board of Patent
Appeals and Interferences from the last decision of the Examiner.

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1. Real Party in Interest

The real parties in interest are The Regents of the University of California and the United States Government.

2. Related Appeals and Interferences

There are no known related appeals (or interferences).

3. Status of Claims

Claims 1-10 stand finally rejected. Claims 11-18 were cancelled in the amendment after final.

4. Status of Amendments

The amendment after final filed 10/02/2002 has been entered.

5. Summary of Invention

Claim 1 recites a composition of matter comprising a solid state material consisting essentially of C36 fullerene molecules (page 3, lines 3-4). The claimed material is formed by a two step process. The C36 is first made in a mixture of many different mass fullerenes by an arc plasma technique (page 5, line 8 to page 6, line 9; mass spectrum of Fig. 1). The C36 is then separated from the other fullerenes (page 7, line 8 to page 8, line 12). The product being claimed is the purified or isolated solid state material consisting essentially of C36 (mass spectrum of Fig. 3). Thus while small amounts of C36 may have been formed previously in a carbon soot (similar to Fig. 1), the claimed purified C36 material (shown in Fig. 3) has not been previously produced.

Claims 2-4 recite the composition of Claim 1 with a crystal structure, and more particularly a hexagonal crystal structure (page 3, lines 4-7; page 8, line 20 to page 11, line 10), and covalent bonding (page 3, lines 9-11; page 8, lines 11-12). Claim 5 recites

an article comprising a coating formed of solid state C36 material (page 3, lines 19-20; page 8, lines 7-8; original Claim 5). Claim 10 recites the composition of Claim 1 wherein the material is in the form of a film or a powder (page 3, lines 19-20; page 7, lines 21-22; page 8, lines 3-8).

Claims 6-9 are directed to the method of making the C36 solid state material. Claim 6 recites producing C36 rich graphite arc soot (page 3, lines 13-15; page 5, line 6 to page 6, line 9); removing higher order fullerenes from the soot, leaving a C36 containing residue (page 3, lines 16-17; page 7, lines 8-13); removing the C36 from the residue (page 3, lines 17-19; page 7, line 14 to page 8, line 8); and producing a solid material from the C36 removed from the residue (page 3, lines 19-20; page 8, lines 21-22; page 9, lines 7-8).

Claim 7 further recites operating a carbon arc discharge in He at about 400 torr pressure (page 3, lines 13-15; page 5, line 14 to page 6, line 9). Claim 8 recites a dual solvent separation and Claim 9 specifies the solvents as toluene and pyridine (page 3, lines 15-19; page 7, lines 7-22).

6. Issues

Are Claims 1-10 unpatentable under 35 USC 112, first paragraph as failing to meet the written description requirement?

Are Claim 1-5, 10 unpatentable under 35 USC 102(b) over Stankevich?

Are Claim 1-5, 10 unpatentable under 35 USC 103(a) over Stankevich?

7. Grouping of Claims

For the 112 rejection, Claims 1-10 do not stand or fall together. Claims 1-5, 10 to compositions/products are separately patentable from method Claims 6-9 since they do

not depend on the particular arc processing parameters. Claim 7 is separately patentable from Claims 6, 8-9 since it includes the particular arc processing parameters that are the basis for the rejection.

For the 102/103 rejections, Claims 1-5, 10 do not stand or fall together. Claim 1 is to the C36 solid state material. Claims 2-4 specify the C36 material with additional features, Claim 5 is directed to a coating made of the C36 material, and Claim 10 is directed to C36 film or powder products, all of which may be separately patentable.

8. Arguments

35 USC 112, first paragraph, written description rejection

On page 2 of both the first and final rejections the Examiner states that "as the specification recites the 400 torr of helium to be an important factor in C36 production, this feature should be incorporated into Claim 6, which does not recite how the production step is done." This is the basis for the rejection of Claims 1-10 under 35 USC 112, first paragraph as containing subject matter not described in the specification in a way to reasonably convey possession of the claimed invention. In the Advisory Action the Examiner further states that "the specification states pressures other than 400 gave no peaks."

It is submitted that the rejection is erroneous in that it focuses only on a specific example, and that the specification in its entirety shows possession of the broader invention as defined in Claim 6.

As stated in both prior responses, this limitation of 400 torr He is a specific detail of one particular embodiment of making C36 and is contained in dependent Claim 7. Claim 6 is a more generic claim to making C36 rich arc soot and separating the C36.

Claim 6 includes the step of "producing C36 rich graphite arc soot" which is the subject matter at issue. The general methods of making graphite arc soot are known, and in light of Applicant's disclosure, one skilled in the art can adjust process parameters such as pressure to enhance C36 production.

The response after final analyzed the description in the specification further:

As described on page 5, "Bulk quantities of C36 are produced by a modified Kratschmer-Huffman arc plasma technique. The technique has been modified to enhance the production of C36." As stated, under normal conditions, higher order fullerenes are produced with very little, if any lower order fullerenes. But, "as part of the invention, it has been determined that under certain conditions, C36 can be produced in relatively large amounts, e.g. 1-2% of the carbon soot." Thus one skilled in the art is lead to vary the process conditions from the normal conditions to increase C36 production.

Page 5 continues: "Optimum parameters for C36 production were determined in a helium environment arc discharge chamber originally designed for C60 production." Several specific parameters of this chamber then follow. This clearly is an illustrative example of one particular chamber, not the only chamber in which C36 could be made. For example arc discharge chambers could use another inert gas than He.

Page 6 states: "The synthesis of C36 is very sensitive to operational parameters, notably helium pressure." Tests from 50-1500 torr He are then described, with 400 torr being optimum. These tests are clearly on the chamber described on page 5. One skilled in the art would not expect all chambers to operate at the same parameters. The broader statement on page 6 clearly leads one skilled in the art to vary the operational parameters of any particular apparatus to find the optimum for C36 production.

As discussed fully in MPEP 2163 the basic inquiry for determining compliance with written description is whether the specification conveys with reasonable clarity to one skilled in the art that applicant was in possession of the claimed invention. *Vas-Cath, Inc. vs. Mahurkar*, 935 F.2d 1555, 1563-1564, 19 USPQ 2d 1111, 1117 (Fed. Cir. 1991)

Here the step at issue involves the production of C36 containing soot. The invention also involves the claimed steps of isolating the C36 from the soot. Thus it is clear that applicant would want to produce soot with as much C36 as possible. Since methods of producing carbon soot are per se known in the art, it is clear that applicant's invention could be applied to any C36 containing soot. And it is also clear that applicant indicates that the amount of C36 produced is very sensitive to process parameters.

Applicant could not possibly give the exact parameters for increasing C36 that would apply to every process for making soot since the process conditions could vary widely. Instead applicant gave a specific example which applicant used to make the C36 material that was analyzed, and described and claimed. But one skilled in the art could routinely vary process parameters to increase C36, and can tell that applicant was in possession of the broader claimed method.

It should be noted that Claim 6 is an original claim. As stated in MPEP 2163 much of the written description case law deals with whether the specification supports claims not originally in the application. There is a strong presumption that an adequate written description of the claimed invention is present when the application is filed. In re *Wertheim*, 541 F.2d 257, 263, 191 USPQ 90, 97 (CCPA 1976) original claims constitute their own description. In re *Koller*, 613 F.2d 819, 204 USPQ 702 (CCPA 1980) Since the original claims are part of the specification, they indicate that applicant considered the

claimed subject matter in his possession, and one skilled in the art would also recognize the claimed subject matter as in applicant's possession.

The Examiner's characterization of Applicant's argument as "C36 can be made using a well-known modification of a standard fullerene (C60) process" is erroneous. Applicant has argued that C36 can be made by a modification, as taught by Applicant and not already well-known, to a well-known standard C60 process. Thus it is the standard process that is well-known, not Applicant's modification thereto to increase C36. Therefore the conclusion that Applicant appears to admit that the present process is obvious over the known prior art is baseless.

Furthermore, even if the step of producing a C36 rich soot were known, it would benefit applicant. The claimed process includes additional steps for first removing higher order fullerenes, then removing C36, and finally forming a solid from the C36. The Examiner has not shown any of these steps in the prior art. Thus even if the C36 producing step is entirely conventional, the claim as a whole is still patentable.

The Examiner states that Claim 6 does not recite performing an arc process. Claim 6 recites "producing ... arc soot." This is one way of reciting the step. How else is "arc soot" produced except in an arc?

Thus it is submitted that the rejection is erroneous because the written description requirement for the broader claims is satisfied. The Examiner has focused only on the most specific information in the specification, e.g. page 6, lines 6-7, to the exclusion of the more general information. Even page 6, lines 6-7 can be taken to teach running the process at a series of different pressures to find the optimum. It would be routine for one skilled in the art to do so in light of applicant's teachings.

The burden of proof on written description is on the Examiner (MPEP 2163.04). The Examiner must show by a preponderance of evidence why one skilled in the art would not recognize in applicant's disclosure a description of the claimed invention. The Examiner has not done so. He merely has stated that a particular pressure is required in the claims. He has provided no evidence to rebut the presumption that the description as filed is adequate nor has he rebutted any of applicant's arguments as to the broader disclosure. He has not shown why one skilled in the art would not consider original Claim 6 as showing possession of the invention as claimed therein.

Claims 1-10 do not all stand or fall together because they do not all recite the processing step at issue. Claims 1-5, 10 to C36 compositions and products are separately patentable because they do not include the processing step at all and thus it is irrelevant whether the method of Claim 6 meets the written description requirements or only the method of Claim 7. Claims 6-9 do not stand or fall together because Claim 7 includes the 400 torr He limitation at issue and thus should be allowed even if Claims 6, 8-9 are not.

35 USC 102(b) rejection over Stankevich

Claims 1-5, 10 are rejected under 35 USC 102(b) as anticipated by Stankevich. The Examiner states that Stankevich teaches C36 on p. 172 and that "As its properties are reported, it appears to have been made and isolated."

The rejection is erroneous because Stankevich does not show that C36 was made or isolated.

As stated in the prior responses, the Examiner's characterization of Stankevich is clearly erroneous. The paper is a purely theoretical paper, with no measured properties reported, and no evidence that C36 was made or isolated. The Examiner was requested to

show any part of the paper where any experimental work leading to Table I is described and has not done so. There is not a scintilla of evidence of experimentation since none was done.

The Abstract states that carbon cluster structures were studied by "topological and valence approaches" which are well-known theoretical methods as clearly shown on p. 170-171. The topological method description on p. 170 is purely mathematical, i.e. "the secular equation ... is subdivided into six equations" and "Calculation ... is reduced to the eigenvalue problem for the six complex matrix Hamiltonians." Likewise the description on p. 171 of the valence method is purely mathematical, i.e. "... have been calculated by the MNDO/PM3 method." The first three lines of p. 169 state that cited work "stimulates further modeling of various carbon cluster structures and prognosis of their properties." Thus the values given in Table 1 on p. 172 are purely theoretical calculations, i.e. the prognosis from the theoretical models.

The Examiner's statement that Stankevitch is no more "theoretical" than Applicant's disclosure and also contains "hard" data supporting actual experimentation is erroneous and baseless. Applicant has shown real experimental results, e.g. the mass spectra of Figs. 1, 3 and the NMR spectra of Fig. 5B. Applicant has also described the apparatus (Figs. 2, 4) and tests involving different He pressures in a particular chamber to determine optimum pressure for that chamber. Stankevitch has no experimental data whatsoever since all values were calculated from theoretical models.

There is also no suggestion of forming coatings as in Claim 5. Claim 10 is directed to the film or powder form of the C36 material which is also not suggested.

To anticipate a claim, the reference must teach every element of the claim.

Verdegaal Bros. vs. Union Oil Company of California, 814 F.2d 628, 631, 2 USPQ 2d 1051, 1053 (Fed. Cir. 1987) To constitute enabling prior art one of ordinary skill in the art must be able to make or synthesize (MPEP 2121.02). The mere naming of a compound in a reference, without more, cannot constitute a description of the compound.

In re Hoeksema, 399 F.2d 269, 158 USPQ 596 (CCPA 1968)

Here the Examiner relies on a reference Stankevich which clearly does not show how to even make the C36 containing soot, let alone isolate it. Applicant has shown that at most the prior art could make a soot containing some C36 as shown in Fig. 1. But the product claimed in Claims 1-5, 10 is that shown in Fig. 3, the purified or isolated solid state form of C36. Stankevich fails totally as an enabling prior art reference since it does not show that C36 material existed prior to applicant's invention. Stankevich merely provides a theoretical drawing of a 36 atom molecule, without any teaching of how to make it.

Thus it is submitted that the rejection is erroneous because Stankevich does not show the existence of C36 material at all and provides no method of making the theoretical molecule shown. Further Claims 1-5, 10 do not stand or fall together since Claims 2-5, 10 contain additional features which are not shown in Stankevich and must be found in the reference to support a 102 rejection. Claims 2-4 recite solid state material with various crystal structures or bonding. They would be separately patentable over a reference that merely showed the C36 molecule. Claim 5 is directed to an article of manufacture comprising a coating made of C36. This use of C36 to form a coating is not shown in Stankevich. Claim 10 is directed to C36 solid state material products in film or

powder form. Again there is no showing of this limitation in Stankevich. Thus Claims 5, 10 are each separately patentable even if the basic C36 molecule is shown in Stankevich.

35 USC 103(a) rejection over Stankevich

Claims 1-5, 10 are rejected under 35 USC 103(a) as obvious over Stankevich.

The rejection is erroneous for the reasons given above against the 102 rejection, i.e. that Stankevich does not show how to make the claimed C36 solid state material, but only shows a theoretical molecule, and does not provide any additional reference which could be combined with Stankevich to show how to make the material. Not only is it necessary to produce a C36 containing soot, but it is necessary to separate the C36 from the other materials in the soot, as applicant has shown. The Examiner has provided no basis whatever to conclude that this separation is already known in the prior art or obvious therefrom.

Thus it is submitted that the rejection is erroneous because Stakevich fails to support either a 102 or a 103 rejection. Claims 1-5, 10 do not stand or fall together for the reasons given above for the 102 rejection since they recite further details or forms of C36 material that are not obvious from a reference which merely shows a C36 molecule.

Respectfully submitted,



Date: April 2, 2003

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9. Appendix: Claims on Appeal

1. A composition of matter comprising a solid state material consisting essentially of C₃₆ fullerene molecules.
2. The composition of Claim 1 wherein the solid state material has a crystalline structure.
3. The composition of Claim 2 wherein the crystalline structure is hexagonal.
4. The composition of Claim 1 wherein the molecules are covalently bonded to each other.
5. An article of manufacture comprising a coating formed of a solid state C₃₆ material.
6. A method of making a solid state C₃₆ fullerene material, comprising:
producing C₃₆ rich graphite arc soot;
removing higher order fullerenes from the soot, leaving a C₃₆ containing residue;
removing the C₃₆ from the residue;
producing a solid material from the C₃₆ removed from the residue.

7. The method of Claim 6 wherein the C₃₆ rich soot is produced by operating a carbon arc discharge in a helium atmosphere at about 400 torr pressure.

8. The method of Claim 6 wherein the higher order fullerenes are removed using a first solvent and the C₃₆ is removed using a second solvent.

9. The method of Claim 8 wherein the first solvent is toluene and the second solvent is pyridine.

10. The composition of Claim 1 wherein the solid state material is in the form of a film or a powder.



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FEE TRANSMITTAL for FY 2003

Effective 01/01/2003. Patent fees are subject to annual revision.

☒ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$)
885

Complete if Known

Application Number	09/518,989
Filing Date	03/03/2000
First Named Inventor	Charles R. Piskoti et al.
Examiner Name	S. Hendrickson
Art Unit	1754
Attorney Docket No.	IB-1366

METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None

☒ Deposit Account:

Deposit Account Number
Deposit Account Name

12-0690

The Commissioner is authorized to: (check all that apply)

☒ Charge fee(s) indicated below ☒ Credit any overpayments

☐ Charge any additional fee(s) during the pendency of this application

☐ Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
1001 750	2001 375	Utility filing fee	
1002 330	2002 165	Design filing fee	
1003 520	2003 260	Plant filing fee	
1004 750	2004 375	Reissue filing fee	
1005 160	2005 80	Provisional filing fee	

SUBTOTAL (1) (\$)

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

Total Claims	Extra Claims	Fee from below	Fee Paid
Independent Claims	-20** =	X	
Multiple Dependent	-3** =	X	

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description
1202 18	2202 9	Claims in excess of 20
1201 84	2201 42	Independent claims in excess of 3
1203 280	2203 140	Multiple dependent claim, if not paid
1204 84	2204 42	** Reissue independent claims over original patent
1205 18	2205 9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) (\$)

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Small Entity

Fee Code (\$)	Fee Code (\$)	Fee Description
1051 130	2051 65	Surcharge - late filing fee or oath
1052 50	2052 25	Surcharge - late provisional filing fee or cover sheet
1053 130	1053 130	Non-English specification
1812 2,520	1812 2,520	For filing a request for <i>ex parte</i> reexamination
1804 920*	1804 920*	Requesting publication of SIR prior to Examiner action
1805 1,840*	1805 1,840*	Requesting publication of SIR after Examiner action
1251 110	2251 55	Extension for reply within first month
1252 410	2252 205	Extension for reply within second month
1253 930	2253 465	Extension for reply within third month
1254 1,450	2254 725	Extension for reply within fourth month
1255 1,970	2255 985	Extension for reply within fifth month
1401 320	2401 160	Notice of Appeal
1402 320	2402 160	Filing a brief in support of an appeal
1403 280	2403 140	Request for oral hearing
1451 1,510	1451 1,510	Petition to institute a public use proceeding
1452 110	2452 55	Petition to revive - unavoidable
1453 1,300	2453 650	Petition to revive - unintentional
1501 1,300	2501 650	Utility issue fee (or reissue)
1502 470	2502 235	Design issue fee
1503 630	2503 315	Plant issue fee
1460 130	1460 130	Petitions to the Commissioner
1807 50	1807 50	Processing fee under 37 CFR 1.17(q)
1806 180	1806 180	Submission of Information Disclosure Stmt
8021 40	8021 40	Recording each patent assignment per property (times number of properties)
1809 750	2809 375	Filing a submission after final rejection (37 CFR 1.129(a))
1810 750	2810 375	For each additional invention to be examined (37 CFR 1.129(b))
1801 750	2801 375	Request for Continued Examination (RCE)
1802 900	1802 900	Request for expedited examination of a design application

Other fee (specify)

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$)
885

SUBMITTED BY

(Complete if applicable)

Name (Print/Type)	Henry P. Sartorio	Registration No. (Attorney/Agent)	28,535	Telephone	(510) 486-4534
Signature	Henry P. Sartorio	Date	04/02/2003		

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